

RICIN

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Potent protein toxin derived from *Ricinus communis*, the castor bean plant

Route of Exposure: Inhalation (the most likely form for bioterrorism) or ingestion

Toxic Dose: The LD₅₀ of inhaled ricin is 3-5 µg/Kg.

Incubation Period: The incubation period for symptoms due to oral ingestion is usually less than 6 hours, although symptoms have been reported as quickly as 15 minutes.

Clinical Effects: If the toxin is ingested, there is a rapid onset of nausea, vomiting, abdominal cramping, fever, and severe diarrhea with vascular collapse. Death generally occurs as soon as the third day. The consequences of human inhalation of ricin toxin is not known. However, in animal models, respiratory distress occurs with airway inflammation, pneumonia, and pulmonary edema. Death usually occurs from 36-72 hours after exposure.

Lethality: The mortality rate due to ricin ingestion is 2-6%. The human mortality rate from inhalational ricin is unknown. Careful attention to fluid and electrolyte balance should lessen mortality.

Transmissibility: Ricin intoxication cannot be transmitted from person to person.

Primary Contamination & Methods of Dissemination: Methods of dissemination due to bioterrorism could be via aerosolization or sabotage of the food or water supply.

Secondary Contamination & Persistence of Organism: Ricin is not volatile. Risk to health care workers from secondary aerosols would be unlikely.

Decontamination & Isolation:

Patients: Only standard isolation precautions are needed. Skin decontamination can be done with soap and water or a 0.5% hypochlorite solution (one part household bleach & nine parts water = 0.5% hypochlorite solution).

Equipment, clothing & other objects: Surface cleansing can be done with a 0.5% hypochlorite solution.

Laboratory Testing: Ricin can be detected in environmental samples by a fluorescence immunoassay or PCR available at the State Health Lab. Ricin testing in body fluids is experimental, but ricin may be able to be detected in body fluids such as emesis, stools, serum, or on nasopharyngeal swabs.

Therapeutic Treatment: Treatment is supportive. Treatment for inhalational ricin should include management for pulmonary edema. If a patient has ingested ricin, gastric lavage with activated charcoal followed by catharsis with magnesium citrate is recommended. It is also important to replace volume due to GI fluid losses, and to be meticulous in fluid and electrolyte management. Ricin is not dialyzable.

Prophylactic Treatment: There is no known prophylaxis for humans. A vaccine is under development.

Differential Diagnosis: Enteric pathogens can cause fever and gastrointestinal involvement, but vascular collapse would be unusual.

Respiratory symptoms can occur with respiratory infections, Q fever pneumonia, plague pneumonia, tularemia pneumonia, toxin inhalation (such as staphylococcal enterotoxin B or trichothecene mycotoxins), and chemical warfare agents such as phosgene.

Aerosolized ricin is distinguished from routine infections by progressive respiratory symptoms in spite of antibiotics, no widened mediastinum (as in anthrax), progressive worsening (respiratory effects of staphylococcal enterotoxin B tend to stabilize rapidly), fewer systemic effects than trichothecene mycotoxins, and a slower progression in symptoms than phosgene exposure.

References:

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For more information call (602) 364-3289

Frequently Asked Questions About Ricin

What is ricin?

Ricin is a poison that can be made from the waste left over from processing castor beans. It can be made into a powder, a mist, a pellet, or it can be dissolved in water or weak acid. It is a stable substance, which means it is not affected much by extreme conditions such as very hot or very cold temperatures.

Where is ricin found and how is it used?

Ricin is part of the waste “mash” produced when castor oil is made. Since castor beans are processed throughout the world, ricin can be found globally. Though considered a poison, ricin can be used for such medical procedures as bone marrow transplants and cancer treatments.

How can people be exposed to ricin?

Accidental exposure to ricin is extremely unlikely, therefore it would take a deliberate act to make ricin and use it to poison people. There three routes of exposure for ricin: inhalation, ingestion, or injection. People can be poisoned by breathing in ricin mist or powder, swallowing food or water contaminated with ricin, or having a ricin pellet or ricin dissolved in a liquid injected into their bodies. Ricin poisoning is not contagious. It cannot be spread from person to person through casual contact.

How does ricin affect the body?

Ricin affects the body by getting inside the cells and preventing them from making the proteins they need. Without the proteins, cells die. Eventually this is harmful to the whole body, and death may occur. Effects of ricin poisoning depend on whether ricin was inhaled, ingested, or injected.

What are the signs and symptoms of ricin exposure?

The symptoms of ricin poisoning depend on the route of exposure and the dose received. Many organs may be affected in severe cases.

Death from ricin poisoning could take place within 36 to 72 hours of exposure, depending on the route of exposure (inhalation, ingestion, or injection) and the dose received. If death has not occurred in 3 to 5 days, the victim usually recovers.

Inhalation: Initial symptoms of ricin poisoning by inhalation may occur within 8 hours of exposure. The likely symptoms would be respiratory distress (difficulty breathing), fever, cough, nausea, and tightness in the chest. Heavy sweating may follow as well as fluid building up in the lungs (pulmonary edema). This would make breathing even more difficult, and the skin might turn blue. Excess fluid in the lungs would be diagnosed by x-ray or by listening to the chest with a stethoscope. Finally, low blood pressure and respiratory failure may occur, leading to death.

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Ingestion: Following ingestion of ricin, initial symptoms typically occur in less than 6 hours. If someone swallows a significant amount of ricin, he or she would develop vomiting and diarrhea that may become bloody. Severe dehydration may be the result, followed by low blood pressure. Other signs or symptoms may include hallucinations, seizures, and blood in the urine. Within several days, the person's liver, spleen, and kidneys might stop working, and the person could die.

Skin and eye exposure: Ricin in the powder or mist form could cause redness and pain of the skin and the eyes.

Note: Showing these signs and symptoms does not necessarily mean that a person has been exposed to ricin.

How is ricin poisoning treated?

There is no antidote for ricin therefore, it is especially important to prevent poisoning by avoiding exposure to ricin. If exposure cannot be avoided, the most important action is to get the ricin off or out of the body as quickly as possible. This may involve flushing the stomach with activated charcoal if the ricin was very recently ingested or washing out the eyes with water if the eyes are irritated.

Ricin poisoning is treated by giving victims supportive medical. The specific treatment depends on how victims were poisoned (inhalation, ingestion, or skin or eye exposure). Care could include such measures as helping victims breathe, giving them intravenous fluids, or giving them medications to treat conditions such as seizures and low blood pressure.

Is there a way to test for ricin?

There is no widely available, reliable test to confirm that a person has been exposed to ricin.

What should people do if they are exposed to ricin?

It is important to get fresh air by leaving the area where the ricin was released. If the ricin release was outside, this means moving away from the area where the ricin was released. If the ricin release was indoors, people should get out of the building. Moving to an area with fresh air is a good way to reduce the possibility of death from exposure to ricin.

If you think you may have been exposed to ricin, you should remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible. If someone has ingested ricin, do not induce vomiting or give fluids to drink. Seek medical attention right away.

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